OFFICE OF THE UNDER SECRETARY OF DEFENSE

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WASHINGTON, DC 20301-3000

ACQUISITION, TECHNOLOGY AND LOGISTICS

November 7, 2001

MEMORANDUM FOR U.S. MISSION TO NATO, ARMAMENTS COOPERATION DIVISION
BOX 200, PSC 81, APO AE 09724

SUBJECT: Draft STANAG 4487 (EDITION 1) – "EXPLOSIVES, FRICTION SENSITIVITY TESTS "

Reference document, AC/310-D/186, 22 January 2001, SAB.

The U.S. Armed Forces ratifies the referenced agreement with comment.

Ratification and implementation details are as follows:

	IMPLEMENTATION					
	Forecast Date			Actual Date		
RATIFICATION REFERENCE	NAVY	ARMY	AIR FORCE	NAVY	ARMY	AIR FORCE
Memo, OUSD(AT&L) DATED AS ABOVE	November 7, 2001			November 7, 2001		

NATIONAL IMPLEMENTING DOCUMENT: MIL-STD 1751 (under revision)

RESERVATIONS: None

COMMENTS: See attached DA Form 4797-R.

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Comments to STANAG 4487E1

NO (a)	NATION (b)	PAGE (c)	PARA (d)	LINE (e)	COMMENT(S) (f)	REASON(S) (g)
1	U.S.	A-2	4	1st paragraph	**COMMENT:** The U.S. maintains that a threshold initiation level (TIL) is a suitable alternative to a 50% load as a measure of friction sensitivity with the BAM Friction Machine. TIL values for an explosive, when accompanied by data for other explosives that have been tested in the same manner and on the same machine, can be used to rank the friction sensitivity of the explosive. The U.S. recommends that consideration be given to including TIL as an alternative to 50% load in the next edition of this STANAG.	
2	U.S.	A-2	4	1st paragraph	**COMMENT:** An absolute value along with a standard material (i.e., RDX) should be called out as an alternative to the Bruceton-method, 50% load.	For this particular equipment we believe the absolute value method gives a more useful answer when a standard is included. The value for the standard is most important no matter the method.
3	U.S.	A-1	3.a)	4	**COMMENT:** Change " unto" to " into"	Assumed typo.

STANAG 4487
(Edition 1)

NORTH ATLANTIC TREATY ORGANIZATION
(NATO)

NATO STANDARDIZATION AGENCY
(NSA)

STANDARDIZATION AGREEMENT
(STANAG)

SUBJECT: EXPLOSIVE, FRICTION SENSITIVITY TESTS

Promulgated on 22 August 2002

Jan H ERIKSEN
Rear Admiral, NONA
Director, NSA

RECORD OF AMENDMENTS

No.	Reference/date of amendment	Date entered	Signature

EXPLANATORY NOTES

AGREEMENT

1. This NATO Standardization Agreement (STANAG) is promulgated by the Director, NSA under the authority vested in him by the NATO Military Committee.

2. No departure may be made from the agreement without consultation with the tasking authority. Nations may propose changes at any time to the tasking authority where they will be processed in the same manner as the original agreement.

3. Ratifying nations have agreed that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purposes of identification.

DEFINITIONS

4. Ratification is "In NATO Standardization, the fulfilment by which a member nation formally accepts, with or without reservation, the content of a Standardization Agreement" (AAP-6).

5. Implementation is "In NATO Standardization, the fulfilment by a member nation of its obligations as specified in a Standardization Agreement" (AAP-6).

6. Reservation is "In NATO Standardization, the stated qualification by a member nation that describes the part of a Standardization Agreement that it will not implement or will implement only with limitations" (AAP-6).

RATIFICATION, IMPLEMENTATION AND RESERVATIONS

7. Page (iii) gives the details of ratification and implementation of this agreement. If no details are shown it signifies that the nation has not yet notified the tasking authority of its intentions. Page (iv) (and subsequent) gives details of reservations and proprietary rights that have been stated.

FEEDBACK

8. Any comments concerning this publication should be directed to NATO/NSA - Bvd Leopold III, 1110 Brussels - BE.

NAVY/ARMY/AIR

NATO STANDARDIZATION AGREEMENT
(STANAG)

EXPLOSIVES, FRICTION SENSITIVITY TESTS

Annexes:

A. BAM Friction Machine
B. Rotary Friction Machine
C. Friction Sensitivity Test Sheet

Related Documents: None

AIM

1. The aim of this agreement is to establish test procedures for providing the friction sensitivity of energetic materials. This is to accommodate the requirement for the qualification of these materials.

2. This agreement is intended for use by the NATO Participating Nations

AGREEMENT

3. Participating countries who have ratified this STANAG have decided to accept each test as standard procedures for determining the friction sensitivity of explosive materials and to use the data exchange formats as provided in the annexes. Either test is required from Annex A or Annex B.

IMPLEMENTATION OF THE AGREEMENT

4. This STANAG is implemented when a nation has issued the necessary orders/instructions putting the contents of this agreement into effect.

1. BAM FRICTION MACHINE

The BAM friction apparatus is employed for the evaluation of the sensitivity of all types of explosive substances to friction. The results are expressed numerically, thereby allowing a relative sensitivity ranking. The test is easily performed, consumes a minimum of test substance and gives reproducible results in agreement with experience in production, handling and transportation. Liquids and pasty substances are usually not tested with the friction apparatus due to their lubricating tendencies and the resulting low heat development that is usually not sufficient to cause reaction.

2. TEST DESCRIPTION

The sensitivity of explosive substances to friction is tested by means of the BAM friction test. The apparatus used and the test rationale are described in detail in several publications. The apparatus, as shown in FIG. A-1, consists of a base plate of cast steel on which the actual device is mounted. This comprises a fixed porcelain peg and a moving porcelain plate. The plate is fixed in a carriage running in two guides and is moved by means of a connecting rod and an eccentric disc operated by an electric motor. A movement consists of a forward and a backward motion of the plate under the porcelain peg of 10 mm in each direction. The motion of the plate is actuated by a starter button in the base plate. The holder of the porcelain peg carries the load arm which is fitted with six equally spaced notches for the attachment of one of nine available weights. Load arm and peg holder can be pivoted for easy replacement of the porcelain peg. Balance is obtained by adjustment of a counterweight. When the peg holder is positioned on the porcelain plate, the longitudinal axis of the porcelain peg is perpendicular to the plate, as shown in FIG. A-2. By means of a ring and hook, a weight is hung in a notch on the load arm. Loads varying from 5 to 360 Newton can thus be realized.

2.1 Porcelain Plates and Pegs

The plates are of white unglazed porcelain and have the following dimensions 25x25x5 mm. Before baking, their surfaces are roughened with a sponge. The sponge marks are clearly visible. The cylindrical pegs are of the same unglazed porcelain. They have a length of 15 mm, a diameter of 10 mm and ends rounded with a radius of curvature of 10 mm. As the natural undamaged roughness of the plates and pegs constitutes an essential factor for the reaction of the explosive substances being tested, each part of the surface may only be used once. In consequence, the two ends of each peg will serve for two tests and the two surfaces of a plate for from three to six tests.

For calculating the load, the acceleration of gravity is set to 10 m/s^2 for simplicity.

3. SAMPLE PREPARATION

A brief description of the way to prepare samples is given in this section.

a. Powder Samples

Powdered substances are sieved through a 0,5 mm mesh screen. Pressed, cast and otherwise compacted substances are crushed before sieving. A measuring spoon fabricated out of conductive plastic should be utilized to measure 10 mm^3 of powder. This powder is then carefully placed into the porcelain plate.

b. Solid Samples

Shavings or thin machined discs of the material can be used (approximate 10 mm^3 of the material: maximum 1mm thick by 5mm in diameter)

c. Paste Samples

Approximately 10 mm^3 of the paste-like material should be used for each test. This can be done by dipping the end of a glass rod in the paste and depositing the paste adhered to the rod onto porcelain plate.

When performing the test, the porcelain plate is fixed on the carriage of the friction apparatus with its sponge marks transverse to the direction of movement. Having clamped the porcelain peg firmly in the holder, the test quantity of 10 mm^3 is placed on the plate. The peg is then set upon the substance so that the major part of the substance is in front of the peg. This is to assure that the substance will come under the peg as the plate is set in motion. After a weight has been placed in the desired position on the load arm, the apparatus is actuated by pressing the starter button.

4. REPORTING RESULTS

The result of the test is determined by various degrees of reaction. The reactions are distinguished between "no reaction", "decomposition", "ignition", "crackling" and "explosion". The relative degree of sensitivity of a substance to friction is indicated by the Bruceton- method where a positive reaction is indicated by an ignition (flash and smoke with large black smear left on the friction surfaces), a crackling (same as ignition, but accompanied with a crackling sound) , or an explosion (detonation) and a no reaction is indicated by a decomposition (slight black smear on porcelain plate) and of course no physical evidence of a reaction. The procedure to determine the 50% load is as follows: the initial load level is determined by the one in six method, (i.e. method reported in BAM manual); this load is then used as the first data point for the Bruceton Method; using TABLE A-1, find a starting point which is as close as possible to the 1 in 6 result and which is a mid point under the column specified by Interval. The column marked Interval describes the equivalent load increments and weights and position to use for the specified load (e.g. Interval 12 are loads in increments of 12). The load, within the column, is increased for no reaction and decreased for a reaction. A total of between 25 and 30 shots are required to give a significant Bruceton 50% mean. For the Bruceton result to be valid, a normal distribution must be assumed and the standard deviation divided by the shot increment (s/D) must have a value greater than 0.5 and less than 2.0. If this value is less than 0.5, the test must be redone with a decreased shot increment; whereas if the value was greater than 2, then the test is redone with an increased shot increment until the condition is satisfied. If the material tested has an initial 1 in 6 value at or above 360N, the Bruceton method is not done and the material is noted as having a result greater than 360N. Other statistical procedures for determining the 50% point may be used if it can be shown that they provide analogous results. Round robin results on PETN and RDX, using the proposed procedure, are shown in TABLE A-2. The results show good consistency among the participating nations.

Substances are frequently tested without sieving, as it is also possible to test substances in compacted form. This is, for example, the case with solid rocket propellants, where pieces are tested in addition to the sieved material. The sample size of the material is such as to allow sufficient material to be pressed by the sliding peg. Test samples must be representative of the original material submitted for testing.

5. ASSESSMENT OF RESULTS

In assessing the qualification of an explosive, it's rank is compared to other explosives (i.e. RDX) performed by the same machine and test. A table, including previous materials tested and the explosive in question, showing the ranking and the 50% results should be provided. The conditions at which the material was tested should also be noted (temperature, etc) along with the sample's physical characteristics (paste, solid, shavings, etc). The Test sheet in Annex C should be used for each test run. Table A-3 show 50% results of some energetic materials.

TABLE A-1 : BAM Friction Load Interval table

Interval 1		Interval 2		Interval 4		Interval 6		Interval 8		Interval 12		Interval 16		Interval 24		Interval 36	
Wt/ Pos	Force	Wt/ Pos	Force	Wt /Pos	Force	Wt /Pos	Force	Wt /Pos	Force	Wt /Pos	Force	Wt /Pos	Force	Wt /Pos	Forc e	Wt /Pos	Force
1-1	5	1-2	6	1-4	8	1-2	6	1-4	8	2-2	12	2-4	16	3-2	24	4-2	36
1-2	6	1-4	8	2-2	12	2-2	12	2-4	16	3-2	24	3-4	32	4-4	48	6-2	72
1-3	7	2-1	10	2-4	16	2-5	18	3-2	24	4-2	36	4-4	48	5-5	72	6-5	108
1-4	8	2-2	12	3-1	20	3-2	24	3-4	32	4-4	48	5-4	64	6-4	96	8-2	144
1-5	9	2-3	14	3-2	24	4-1	30	5-1	40	6-1	60	7-1	80	8-1	120	9-1	180
1-6	10	2-4	16	3-3	28	4-2	36	5-2	48	6-2	72	7-2	96	8-2	144	9-2	216
		2-5	18	3-4	32	4-3	42	5-3	56	6-3	84	7-3	112	8-3	168	9-3	252
		2-6	20	3-5	36	4-4	48	5-4	64	6-4	96	7-4	128	8-4	192	9-4	288
				3-6	40	4-5	54	5-5	72	6-5	108	7-5	144	8-5	216	9-5	324
						4-6	60	5-6	80	6-6	120	7-6	160	8-6	240	9-6	360

WEIGHT NUMBER	1	2	3	4	5	6	7	8	9
Mass* (g)	281	561	1121	1682	2242	3361	4482	6723	10073

* Mass includes 68 grams for the hook

TABLE A-2 : Round Robin test results of proposed statistical method on PETN and RDX

	PETN	RDX
USA	56	128 (2,5ℓm)
ITALY	82 à 102	110 to 130
FRANCE	83	360*
CANADA	78	152
GERMANY	60	160
NETHERLANDS	76	185

* Different class of RDX used. Larger particle size

TABLE A-3 : Sample results at room temperature

PETNF (©10ℓm)	67 N	--
HMX	113 N	
RDX (0 - 100ℓm)	133 N	French statistical procedure
88% RDX 12% HTPB	46% à 353 N	
TNT	10% à 353 N	
Tetryl	™ 353 N	
AP (200ℓm)	0% à 353 N	

84 % RDX 16 % HTPB (paste) 191 N (by method described in text)

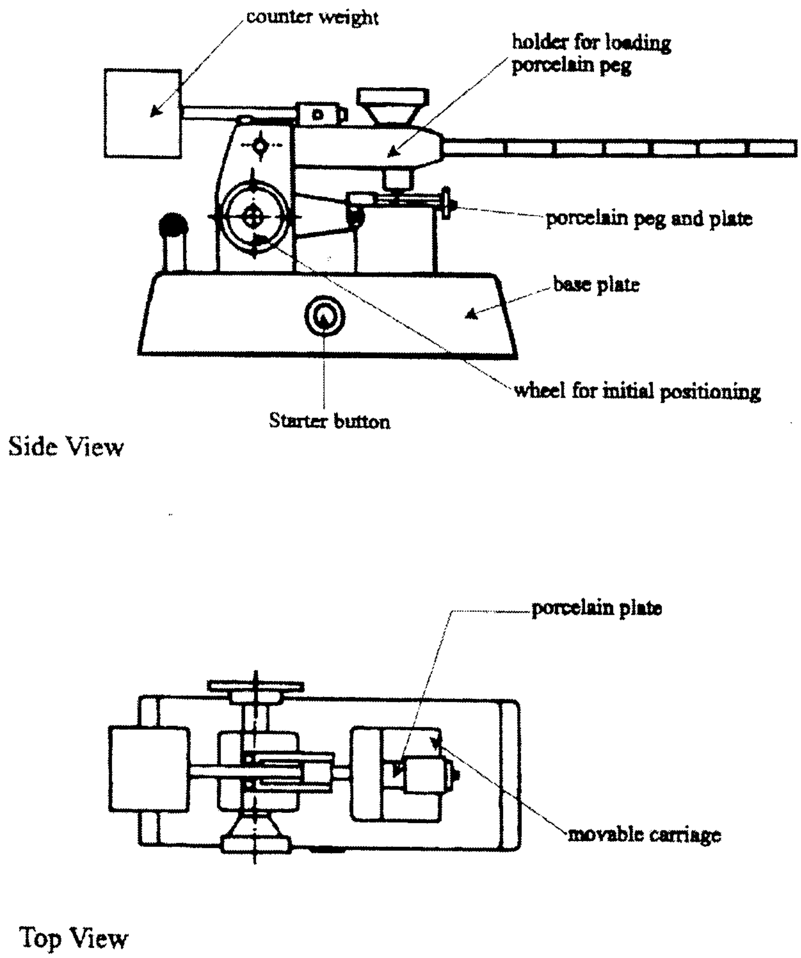

FIG A-1. A schematic of the BAM friction tester.

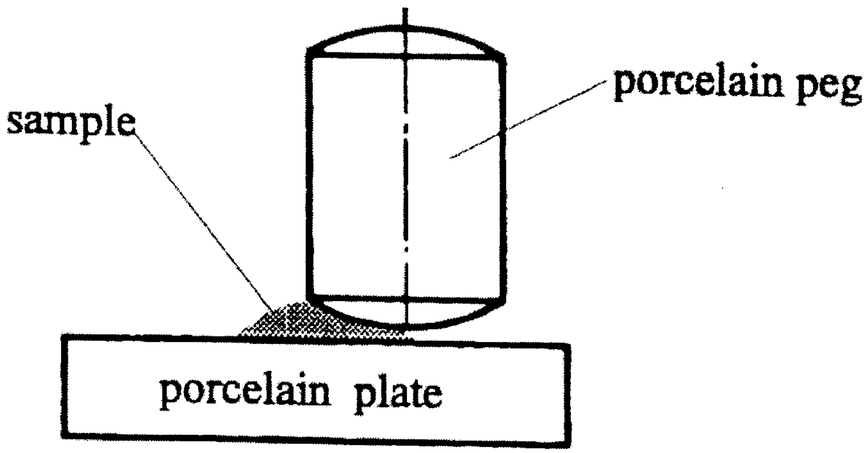

FIG. A-2. Peg and plate configuration with sample.

1. ROTARY FRICTION TEST

This test is designed to provide a quantitative assessment of the friction sensitiveness of a wide range of solid explosives.. Although any wheel and block materials of interest can be used, the standard test uses mild steel blocks and wheels of standard surface roughness. Results are expressed relative to those for standard RDX by assigning a value of 3.0 to the Figure of Friction for the standard RDX. This value was chosen because it is close to the actual median peripheral wheel velocity (m/s) when testing the standard RDX.

In this test a Bruceton Staircase procedure is used over 50 trials to establish a median flywheel angular velocity for the test material. Results are expressed in terms of Figures of Friction relative to standard RDX.

2. PRINCIPLES OF OPERATION OF THE MACHINE

Energy stored in a flywheel imparts an impulse to the wheel assembly, causing it to rotate. This rotation generates high shearing forces in the sample which is under a preset load between the wheel and the stationary block. Machine variables are flywheel velocity and block-to-wheel loading. Flywheel velocity is adjusted using a multi-turn potentiometer. A tachogenerator on the motor shaft with electrical feedback circuits to the electric motor enables this adjustment to be made rapidly and accurately. Flywheel velocity is displayed on a digital meter. Pressure loading of the sample is achieved using a pneumatically operated ram and adjusted using an air regulator. A small positive air pressure is maintained inside the machine to prevent the ingress of explosive dust.

Wheels are located on the wheel assembly by three studs. Each wheel is used for six trials, using a fresh portion of the peripheral wheel surface for each trial. This is achieved by rotating a wheel through 120E about its centre, giving three different positions and then repeating this after rotating the wheel through 180E about a diameter giving a further three positions.

The blocks are offset with respect to the wheel centreline so each of the four equal-area faces of the block can be used twice, giving eight trials per block. In operation, a small amount of metal tends to be removed from the blocks by the harder wheels. The working surfaces are separated by a cam after each strike i. the wheel assembly rotates through 55+5E.

The precise angular rotation before separation is controlled by the position of the locking collar on the pneumatically operated piston shaft. This position must be checked and adjusted if necessary at suitable intervals.

3. SAMPLE PREPARATION

The samples should be thermally conditioned to the test bay environment (between 20-25°C) for at least 12h before testing, and should be stored in covered clean containers. Samples which readily take up water vapour should be stored in similar conditions, but over freshly activated silica gel or molecular sieve. Samples can be tested in other than the standard form if so requested. When crushing or grinding samples the minimum amount of work should be performed to reduce the particle size and pass the sample through the sieve. The test sample must be representative of the original sample.

	Type of Material	Description	General Preparation
1.	Fine – passing a 850 μm BS sieve	Powders or grains	Inspect to ensure homogeneity. Mix if necessary.
2.	Coarse- not passing a 850 μm BS sieve		
2.1	Brittle – non reinforced	Powders or lumps	Break down larger pieces with a wooden roller and if necessary, crush with an agate mortar and pestle until powder passes a 850 μm BS sieve.
2.2	Brittle - reinforced	Powders or lumps	The sender should be asked to press a small pellet (1-2 cm diameter) of reinforced moulding powder, and this, or in the case of a reinforced casting, a small piece cut from the charge, should be microtomed using a 20 μm cut. If no microtome is available, an alternative method is to break down the moulding powder or casting with a wooden roller and sieve out the reinforcing material. This is then finely chopped and mixed with the powder.
2.3	Soft, friable		Rub through a 850 μm BS sieve to obtain a coarse powder.
2.4	Dough like	Mouldable by hand	Spread to a thickness not exceeding 0,5 mm.
2.5	Rubbery	Not mouldable by hand but can be cork-bored	Cut slices not thicker than 0,5 mm.
2.6	Tough	Too hard to cork-bore	Retain some 1/8" cords is available. Sieve through a 850 μm BS sieve after passing the sample through a suitable propellant grinding mill, or alternatively, after filing using a coarse file.

4. PROCEDURE

The surfaces of the set of ten wheels and of ten blocks are prepared by grit blasting. After preparation it is important not to touch the striking surfaces until after testing.

15 mm^3 of the test material is positioned on an unused portion of the block surface. The block is carefully positioned in the block holder. The pin at the centre of the wheel assembly is checked to ensure that the solenoid is in its 'power off' position, i.e. the pin is fully depressed. The wheel assembly is rotated anti-clockwise until rotation is stopped by the pawl. A wheel is positioned on the wheel assembly so that a fresh surface is located above the sample and the door of the machine is then closed. The action of the wheel is illustrated in FIG.B-1. The pneumatic ram is actuated and the loading pressure adjusted to 276kPa (40psi). The flywheel speed is set and the firing button depressed. After each trial the ram is lowered, the door opened, the pin checked to ensure that the solenoid has de-activated and the wheel assembly is rotated anti-clockwise to its stop. The wheel is removed and repositioned and the block is removed and reloaded so that a fresh pair of surfaces is used for each trial.

A fifty-shot Bruceton Staircase run is performed using a logarithmic scale of flywheel speeds with an increment of 0.1 and passing through 100rpm. An ignition is judged to have occurred if there is obvious audible evidence and the sample is consumed, or if sparks are observed, or if the sample is partly consumed and there is evidence of combustion. This is often seen as small black traces on the block leading out from a darkened region of combustion products. If the friction sensitiveness of the sample is unknown or if it is thought to be relatively insensitive, testing should commence from a point corresponding to roughly half of the maximum stimulus level. Relatively insensitive samples may not cause sufficient ignitions to perform a Bruceton run. The upper limit to flywheel velocity is usually taken as 398rpm. In this case ten trials are performed at this level and the result reported as greater than the peripheral wheel velocity equivalent to 398rpm for the machine (these results give an F of F greater than 6).

At the lower limit of the stimulus scale a minimum flywheel velocity or 40rpm is normally used. If ignitions are obtained in a high proportion of tests at this level the loading should be reduced to 34kPa (5psi). A Bruceton run can then usually be achieved down to 20rpm if necessary.

A weekly standard test on RDX must be performed in order to calibrate the test results.

5. CALCULATION OF RESULTS

The average wheel diameter must be measured across the working surfaces whenever a new set of wheels is to be used. The mean wheel wear rate must also be established and allowed for at intervals during the wheel lifetime. For instance at RARDE(WA) where on average at least one Bruceton run is performed every working day the average wheel wear rate has been established as:

$$<D = 0.07t$$

where D (mm) is the wheel diameter and t (months) is the time. Wheel diameter is corrected in this way monthly. Each machine is calibrated in terms of the ratio of the flywheel-to-wheel-assembly working diameter. This enables a given flywheel speed to be equated to a peripheral wheel velocity once D is known; thus:

$$V = \frac{\mapsto\circ DR}{60}\ ms^{-1}$$

for D expressed in meters and where

V = peripheral wheel velocity (m/s)

R = rotational speed (revolutions per minute).

The median flywheel speed and its standard deviation are calculated from the results of the Bruceton run and these values are converted to peripheral wheel velocities.

6. REPORTING OF RESULTS

Median peripheral wheel velocities are converted to Figures of Friction using the formula

$$F\ of\ F = \frac{3V_{50}}{RM}\ \sqrt{L/40}$$

Where :

V_{50} = Median peripheral wheel velocity (m/s)

RM = Current Running Mean value of V (m/s) (typically 2.25m/s)

L = Applied pressure (psi)

and 3 is, by definition, the F of F of Standard RDX

If the internal standard deviation from a median peripheral wheel velocity determination is greater than three scale increments (0.3), the cause should be investigated and reported.

Over the loading range of interest the following relationship has been found to be a reasonable approximation:

$$\text{Load x (velocity)}^2 = \text{constant}$$

The results should be ranked to other energetic materials as shown in the TABLE B-1.

TABLE B-1 : Typical Results

Sample	**Figure of Friction**	**Typical value V_{50} (m/s)****
Pb styphnate / Ba nitrate / Ca silicide / Pb dioxide/ Sb sulphide/ Tetrazene 38/39/11/5/5/2	0,005	0,01
Boron / Bi oxide 10/90	0,02	0,04
Boron / Bi oxide / Cr oxide 10/85/5	0,03	0,1
Lead azide	0,07	0,1
Boron / Bi trioxide / Cr oxide 10/60/30	0,10	0.2
Silver azide	0,12	0,3
Lead styphnate	0,17	0,4
Boron / Bi oxide / Cr oxide 12/66/22	0,17	0,4
Boron / Bi oxide / Cr oxide 10/53/37	0,22	0,5
PETN	1,3	1,0
HMX	1,5	1,1
HTPB, composite propellant	1,6	1,2
Extruded double base propellant	2,4	1,8
RDX	3,0	2,3
RDX / wax	5,1	3,8
TNT	6	4,5

** Varies from week to week. Running mean changes due to wheel diameter wear in the 6 month life of the wheel.

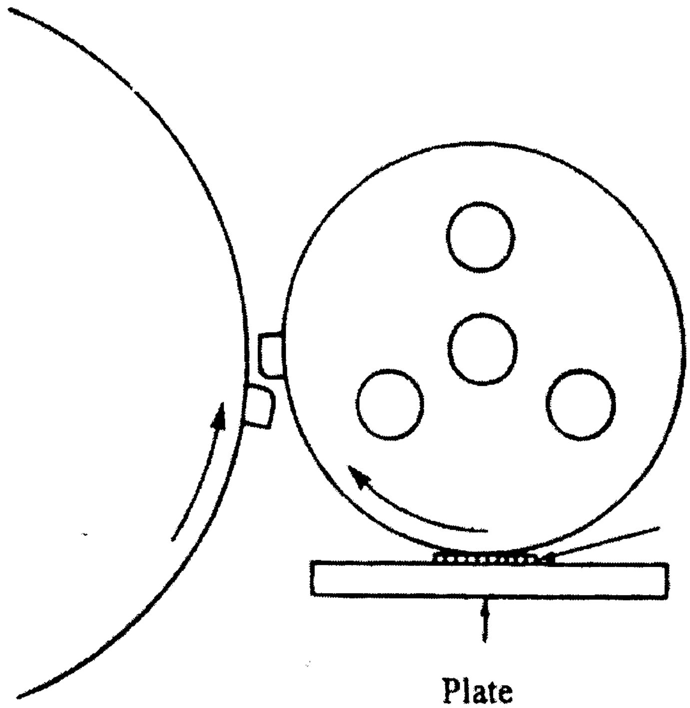

FIG B-1. Action of Rotary Friction Sensitivity Test.

ANNEX C to
STANAG 4487
(Edition 1)

FRICTION SENSITIVITY TEST SHEET

Explosive material tested : ____________________

Condition of sample : ____________________

Test apparatus used : ____________________

Test organization: ____________________

Test date: ____________________

TESTS RESULTS

No. of trials : ________ 50% Point (N) : ________ Interval : ________ Standard deviation (N) : ________
x = pos. reaction ; o = neg. reaction

Nbre d'échantillons

ion e	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42

RATIFICATION AND IMPLEMENTATION DETAILS
STADE DE RATIFICATION ET DE MISE EN APPLICATION

NATION	NATIONAL RATIFICATION REFERENCE DE LA RATIFICATION NATIONALE	NATIONAL IMPLEMENTING DOCUMENT NATIONAL DE MISE EN APPLICATION	IMPLEMENTATION / MISE EN APPLICATION					
			INTENDED DATE OF IMPLEMENTATION/ DATE PREVUE POUR MISE EN APPLICATION			DATE IMPLEMENTATION WAS ACHIEVED/ DATE REELLE DE MISE EN APPLICATION		
			NAVY MER	ARMY TERRE	AIR	NAVY MER	ARMY TERRE	AIR
BE								
CA	2441-4487 (A/DAPM 4-3) of/du 26.11.01	STANAG	01.02	01.02	01.02			
CZ	6/2-48/2001-1419 of/du 22.08.01	Czech Defence Standard Nr. 137601					09.01	09.01
DA	FKO MAI2 204.69-S4487 0101789-003 of/du 17.08.01	STANAG	01.03	01.03	01.03			
FR								
GE	BMVg - Fü S I 6 - Az 03-51-60 of/du 28.03.02	STANAG		11.02				
GR								
HU								
IT								
LU								
NL	M2002001133 of/du 14.03.02					07.02	07.02	07.02
NO								
PL								
PO								
SP								
TU								
UK	D/DStan/12/15/4487 of/du 16.05.01	STANAG44872818	07.02	07.02	07.02			
US	Memorandum of/du 7.11.01	MIL-STD-1751	11.01	11.01	11.01	11.01	11.01	11.01

* See reservations overleaf/voir réserves au verso
+See comments overleaf/Voir commentaires au verso
X Service(s) implementing/Armées mettant en application

RESERVATIONS/RESERVES

NIL / SANS

COMMENTS/COMMENTAIRES

UNITED STATES

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- The U.S. maintains that a threshold initiation level (TIL) is a suitable alternative to a 50% load as a measure of friction sensitivity with the BAM Friction Machine. TIL values for an explosive, when accompanied by data for other explosives that have been tested in the same manner and on the same machine, can be used to rank the friction sensitivity of the explosive. The U.S. recommends that consideration be given to including TIL as an alternative to 50% load in the next edition of this STANAG.

- An absolute value along with a standard material (i.e. RDX) should be called out as an alternative to the Bruceton-method, 50% load.

ETATS-UNIS

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- Les Etats-Unis estiment qu'un niveau d'amorçage de seuil constitue une solution de rechange intéressante au seuil à 50% pour mesurer la sensibilité au frottement avec l'appareil BAM. Pour évaluer la sensibilité au frottement d'un explosif, on peut utiliser des valeurs d'amorçage de seuil, pour autant qu'elles soient accompagnées de données appartenant à d'autres explosifs qui ont été testés de la même manière et sur la même machine. Les Etats-Unis recommandent d'envisager d'inclure dans la prochaine édition de ce STANAG le niveau d'amorçage de seuil comme solution de rechange au seuil de 50%.

- Une valeur absolue, ainsi qu'un matériau standard (par exemple de l'hexogène) doivent être incorporés comme solution de rechange à la méthode Bruceton, avec un seuil à 50%.